

In the Claims:

1. (Currently Amended) A method for forming a capacitor of a semiconductor device, comprising the steps of:

- (a) forming an oxide film on an interlayer insulating film having a storage electrode contact plug;
- (b) selectively etching the oxide film to form an opening exposing the top surface of the storage electrode contact plug;
- (c) forming a ~~conductive~~ polysilicon layer on the bottom and the inner walls of the opening;
- (d) removing the oxide film to form a polysilicon storage electrode;
- (e) forming a dielectric film having a stacked structure of Al-rich HfO₂-Al₂O₃ film and Hf-rich HfO₂-Al₂O₃ film on the surface of the polysilicon storage electrode;
- (f) annealing the dielectric film; and
- (g) forming a plate electrode on the dielectric film.

2. (Original) The method of claim 1, further comprising the step of cleaning the surface of the storage electrode with a cleaning solution of NH₄OH : H₂O₂ : H₂ = 1 : (4 ~ 5) : (20 ~ 50) after the step (d) to form an oxide film having a thickness ranging from 3 to 5Å on a surface of the storage electrode.

3. (Original) The method of claim 1, further comprising the step of cleaning the surface of the storage electrode with an HF or BOE solution and performing an RTO process after the step (d) to form an oxide film having a thickness ranging from 8 to 15Å.

4. (Original) The method of claim 1, wherein the step (e) is performed in an ALD process and the thickness of the Al-rich HfO₂-Al₂O₃ film and the Hf-rich HfO₂-Al₂O₃ film is 5 to 30Å and 10 to 100Å, respectively.

5. (Currently Amended) The method of claim 1, wherein the step (e) is performed in an ALD process using Al(CH₃)₃ Al(CH₄)₃ as an Al source, HfCl₄ as an Hf source and H₂O, O₃, O₂ and N₂O as an O source, one cycle for Al₂O₃ ALD process comprising Al pulse, N₂ purge, O pulse and N₂ purge, and one cycle of HfO₂ of the ALD process comprising Hf pulse, N₂ purge, O pulse and N₂ purge processes.

6. (Original) The method of claim 1, wherein the step (e) is an ALD or CVD process performed at a temperature of 150 to 600°C.

7. (Currently Amended) The method of claim 1, wherein the step (e) is an ALD process using a Hf source selected from the group consisting of HfCl₄, Hf[N(C₂H₅)₂]₄, Hf[N(CH₃)₂]₄ HF[N(CH₃)₂]₄, Hf[N(CH₃)(C₂H₅)]₄, Hf[OC(CH₃)₃]₄, Hf(NO₃)₄, and combinations thereof, and an O source selected from the group consisting of H₂O, O₂, N₂O, O₃, and combinations thereof, one cycle of HfO₂ of the ALD process comprising Hf pulse, N₂ purge, O pulse and N₂ purge in.

8. (Original) The method of claim 1, wherein a ratio of HfO₂ : Al₂O₃ in the Al-rich HfO₂-Al₂O₃ film ranges from (1 cycle: 1 cycle) ~ (9 cycle: 1 cycle).

9. (Original) The method of claim 1, wherein a ratio of HfO₂ : Al₂O₃ in the Hf-rich HfO₂-Al₂O₃ film ranges from (9 cycle: 1 cycle) ~ (2 cycle: 1 cycle).

10. (Original) The method of claim 1, wherein the step (f) is performed at a temperature ranges from 500 to 900°C under oxygen or nitrogen gas atmosphere for 1 to 10 minutes.

11. (Original) The method of claim 1, wherein the step (f) is performed in a furnace at a temperature ranges from 500 to 900°C under oxygen, nitrogen or N₂O gas atmosphere for 10 to

60 minutes.

12. (Original) The method of claim 1, wherein the step (g) is a CVD process for forming the plate electrode using a material selected from the group consisting of TaN, TiN, WN, W, Pt, Ru, Ir, doped polysilicon, and combinations thereof.

13. (Currently Amended) A method for forming a capacitor of a semiconductor device, comprising the steps of:

- (a) forming an oxide film on an interlayer insulating film having a storage electrode contact plug;
- (b) selectively etching the oxide film to form an opening exposing the top surface of the storage electrode contact plug;
- (c) forming a conductive polysilicon layer on the bottom and the inner walls of the opening;
- (d) removing the oxide film to form a polysilicon storage electrode;
- (e) forming a dielectric film using Al-rich HfO₂-Al₂O₃ film on the surface of the polysilicon storage electrode;
- (f) annealing the dielectric film; and
- (g) forming a plate electrode on the dielectric film.

14. (Currently Amended) A method for forming a capacitor of a semiconductor device, comprising the steps of:

- (a) forming an oxide film on an interlayer insulating film having a storage electrode contact plug;
- (b) selectively etching the oxide film to form an opening exposing the top surface of the storage electrode contact plug;
- (c) forming a conductive polysilicon layer on the bottom and the inner walls of the opening;

- (d) removing the oxide film to form a polysilicon storage electrode;
- (e) forming a dielectric film having a stacked structure of Al₂O₃ film and Hf-rich HfO₂-Al₂O₃ film on the surface of the polysilicon storage electrode;
- (f) annealing the dielectric film; and
- (g) forming a plate electrode on the dielectric film.